799TH ORDINARY GENERAL MEETING

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL, WESTMINSTER, S.W.1, ON MONDAY, APRIL 6TH, 1936 AT 4.30 P.M.

DOUGLAS DEWAR, ESQ., B.A., F.Z.S., IN THE CHAIR.

Before proceeding with the business of the Meeting, the CHAIRMAN made reference to the death on March 29th of the Rev. Harold C. Morton, M.A., Ph.D., one of their most valued Members, and read a Resolution which had been passed by the COUNCIL at their Meeting that afternoon as follows :—

Resolution.

"The President, Vice-President and Council of the Victoria Institute hereby record their great regret and sorrow at the death on Sunday, March 29th, 1936, of the Rev. Harold C. Morton, M.A., Ph.D.

Dr. Morton, who had been a member of the Society since 1925, served also on the Council, his mature, wise judgment on many matters being held in high esteem by his Colleagues.

In addition, he placed the Society as a whole under great obligation by contributing many invaluable papers on Philosophical subjects and by participating from time to time in the discussions.

They desire to add an expression of their very deep sympathy with Mrs. Morton and her family in their irreparable loss."

The Resolution was then endorsed by all Members, Associates and friends present standing in silence as an expression of their sympathy.

The Minutes of the Meeting of March 23rd were then read, confirmed and signed, and the HON. SECRETARY announced the following elections :— Associates : Dr. W. Thomson Walker ; Col. N. M. McLeod, D.S.O., M.C., late R.A.

The CHAIRMAN then called on Dr. R. E. D. Clark to read his paper, entitled "The Present Position with Regard to the Origin of Species."

THE PRESENT POSITION WITH REGARD TO THE ORIGIN OF SPECIES.

By R. E. D. CLARK, M.A., Ph.D.

THE advance of science in recent years affords indications that a theory of special creation of species may once again hold the field. But such a theory is not likely to become a part of science, for it is becoming universally recognised

that science cannot make use of the idea of creation. The aim of science is to find relations between events, and this means that for every event science wants to discover a cause. But God and creation cannot be thought of as caused; if they are invoked the string of causes must cease. It is the same with the conceptions of purpose and mind in living creatures. Most people agree that these exist and religion and philosophy must take them into account; but they must not enter scientific text-books. It is not sufficient that a fact should be true in order that it may form a part of science.

A little consideration will show that this is no novel outlook. There are many cases in which perfectly true ideas must not be allowed to influence our method of living. The Bible recognises this. It tells us that no Christian is free from sin, but that we must live without allowing this belief to influence us: we must seek to be perfect as God is perfect. It would be wrong to say: "Since I cannot be as perfect as God, I need not seek perfection." Large numbers of other examples could be given. Thus there is a definite place for ideas which, though true, must never influence practice.

Science is akin to practice. It stands, not for a complete system of all knowledge, but for a method of attack—in short, for experiment. Thus it is natural that there should be certain ideas which it cannot use. It can use no ideas which do not suggest experiments.

It is for this reason that it cannot find a place for God, and so cannot interest itself in special creation. Science could almost be defined as the study of that part of nature which goes by itself and does not need God or even the minds of human beings. An example may make this clearer. An engineer builds a bridge and calculates that it will withstand such and such a stress. He finds that it collapses under a lesser stress—his science cannot explain why. If he is a Christian man he will not say "Science cannot explain this, it must be the hand of God." Instead, he will go through all his workings again in the hopes of finding a mistake. He may believe strongly in miracles, but that belief must never influence his actions in such a case as the above. No one could expect him to listen quietly to arguments proving the existence of miracles, as though this were relevant to such a situation. It would be absurd to tell him that he was fighting facts, or that it was his duty to sit down quietly and accept the

breakdown as a miracle. It is equally absurd to ask science to listen to the evidence of the working of God. Such ideas do not belong to science, though they may very well belong to the scientist in another capacity. It is this which Christians have so often failed to realise.

If, then, a belief in special creation is ever to become accepted again among biologists, it must be accepted by them as men, not as a part of their science. Their science will have to go on doggedly looking for causes, pushing things back farther and farther. When it reaches a stop it will not be interested any more. That is what has happened in physics and astronomy. We can push the universe back between a billion and ten billion years, but further than that it is not possible to go. What happened then was an event which looks very like creation by a mind, but science can only be interested in what happened after that event. Moreover, the scientist holds that the universe must be about the age mentioned, for it is only then that the idea of cause fails, and science must find causes as far back as possible. Yet common sense says that if there was a miracle a billion years ago, there is no improbability in the view that the miracle took place in much more recent times. It is only science as science which cannot allow such speculations.

Evolution has been studied a great deal in recent years, and evidence is slowly accumulating that if it is pushed back far enough it will reach a position very like that of astronomy. People used to point to the fossils and see in them a gradual evolution. The ancestor of the horse started off the size of a dog, and by and by it grew in size and its toes decreased in number. In the course of ages a creature of modern dimensions resulted. Several well-marked series of shell-fish showed a similar story. Sometimes these evolutions are gradual, each generation differing from the last in a hardly perceptible way, but often there are sudden jumps. The horse is gradual with regard to its size, sudden in the diminution of the size of its toes. This sudden type of change was not recognised at first. When it occurred it was easily explained away—the evolution might have been continuous in some other part of the earth. But now both types of evolution are recognised.

These records from the rocks suggested that all life must have sprung from the lowest forms. Aristotle's observation that the fœtus in the egg goes through stages resembling lower forms

of life seemed to favour such a view. Then widely different creatures were found to be built upon the same general plan, so much so that human anatomy could be taught from the bodies of animals. There were parts of the animal frame which seemed to serve no useful purpose, but corresponding organs were useful in lower forms of life. These things also gave colour to the above theory. There seemed no alternative save evolution or the view that the devil hid the fossils to deceive, if it were possible, the very elect. Most people accepted evolution. Many Christians embraced the idea and sought to reconcile it with their faith. Generally they abandoned the first chapters of Genesis and decided that Christ was severely restricted by the errors of His age.

But in recent times science has only gone to confirm what common sense indicated all along, that evolution cannot explain the origin of species. Reproduction of living things, or rather of the *physical parts* of living things (for science has no knowledge of the soul), is a mechanical process. The mere fact that monstrosities result and can be produced experimentally long suggested that this was the case. The irradiation of the nuclei of cells by X-rays produces perfectly random changes, and investigation has gone to show that these changes are precisely the same in character as those which take place in nature. The fossil records confirm the same absence of design. Race after race changed in ways which resulted in their extinction. There was no evidence whatever that the hand of God was ruling these changes in "evolution," as many of the theologians had supposed.

Experimental and mathematical work in genetics have gone to confirm the existence of the two types of evolution, the gradual and the sudden—both occurring without design, at random. The gradual is determined by survival of the fittest, as Darwin supposed, the sudden by changes in the cells similar to those produced by artificial means. Thus evolution on its *physical* side is not the result of miracle, but is subject to the laws of physics and chemistry like the inorganic world. That, at any rate, is the natural conclusion from these and many other facts, and it is the starting point of biological research. A few philosophically minded biologists have disagreed, as have the modernist theologians, yet their views command no respect among most scientists.

If this purely mechanical outlook is wrong, there is room for miracle—though some would like to hide it under the cloak of more difficult words. But if it is right, it is now becoming obvious that causes can only be pushed back a certain way. They cannot be pushed back to protoplasm or the primæval slime which generated protoplasm as our fathers had supposed. It is only possible to push them back to some ready-made species, and there the cause becomes baffling. It is like the problem of astronomy repeated. At some point the uniformity of nature went wrong, and science can get no further. It must go on asking for causes in vain, for it cannot allow miracle. Yet, just as in the case of astronomy, there are good grounds of analogy for supposing that creation of living creatures must have taken place. This idea is outside science in the sense that it must never influence science, yet it appears to be none the less true.

The evidence has come in the following way. *Cytology* (the study of cells) has shown that every cell contains a number of small particles called chromosomes. When the cell divides these particles reproduce themselves so that every cell in the body possesses identical particles. It has been found possible to connect various changes in the chromosomes with changes in the grown-up individual, so that as a result of direct experimental work it has become tolerably certain that the form, or at any rate the detailed structure, of an individual is determined by the structure of the chromosomes. These facts were first suggested by Mendel's observations on garden peas, where it seemed certain that there must be some structures in the cells which made plants tall or short. The chromosomes in some species are sufficiently different from one another to allow them to be distinguished easily. In such cases they can often be mapped out. This means that the structures in the chromosomes which are connected with the various characters, such as tallness, eye colour, hairs in different parts of the body, number of facets in the eye and so on, can be shown to exist in a definite order in the various chromosomes. The methods by which this can be done need not detain us here. The units in the chromosomes are known as *genes*. They must consist of complicated organic structures. The smallest of them appear to be at least a million times as heavy as a hydrogen atom.

It is now generally agreed that changes in the genes themselves, and in their positions with respect to one another, afford

the raw material for evolution. The evidence for this is good. Examples of the main changes which have occurred in the rocks can be produced in the laboratory. Take the case of an animal the size of a dog becoming one the size of a horse. Exactly the same kind of result has been observed repeatedly in plants where it may take place in different ways. By purely artificial means the number of chromosomes in the cell may be doubled, and this results in a large and sudden increase in size. A similar result might easily take place during long periods if natural selection were picking out the fittest. The records of fossils do not show any phenomena which are inconsistent with the experimental science of genetics. A far greater period has elapsed in geological time and, as would be expected, there has been greater opportunity for profounder external changes to result; but there does not appear to be anything radically different in kind.

Suppose, then, that orthodox views—natural selection, the correctness of the series of fossils, and so on—are accepted. Does that lead to abandonment of the special creation doctrine? In the past people have answered in the affirmative, but it is now becoming abundantly clear that that answer is incorrect. All that is observed in genetical experiments, and all that is observed in the rocks, appear to be nothing more than chance variations of already given structures. This can be called evolution if evolution merely stands for change, but it is not the kind of evolution which could make an animal out of dead matter. It is not constructive evolution. The variations are often large so far as the external form of an animal may go—but both in the rocks and in the laboratory they are more often destructive, and end in extinction, than constructive. How did the original chromosome structures arise? One authority calculates that the chances against any particular arrangement of the genes in the chromosomes must be 10^{1000} at the minimum,* and it is probably much higher. But that is only for the arrangements of the genes when formed. The actual building of a gene in a particular way must involve an enormous number of possibilities, probably at least as great as the above number. This

* Sewell Wright. "The Roles of Mutation, Inbreeding, Crossbreeding and Selection in Evolution," International Congress of Genetics, Ithaca, 1932, vol. i, p. 356.

means that the production of a chromosome by random movements of molecules involves that this occurrence will happen once in not less than $10^{10^{3\cdot5}}$ times.

If the matter is not considered from the point of view of a chromosome being built up suddenly, but natural selection is allowed to work all the time, so that a given chromosome structure can become more and more complicated through the course of ages, the chances are of course greatly reduced; but the power to which 10^{10} must be raised is negligibly reduced. $10^{10^{4\cdot5}}$ is enormously greater than $10^{10^{3\cdot4}}$, but that makes no difference to the present argument.

It is impossible for natural selection to result in more and more complex structures unless the number of individuals is greater than the number of the chances against the constructive change, and on the most liberal basis it is impossible to get the chances low enough. The number of electrons in the entire universe is only about 10^{79}* and the chances against the formation of these structures in the chromosomes are unimaginably greater. Thus the whole situation suggests that differing kinds of species were created at remote epochs: first the simpler forms of life, later the more complex. That is what geology indicates, but with the evidence at present available it would look as if arguments that an evolutionary connection existed between them should be viewed with much suspicion. No doubt the number of species created was small, and each gave rise to many others in the course of time.

Lastly, it must be emphasised again that creation is not a scientific idea. Science can only go back to the moment of creation and reach an *impasse*. It has reached that *impasse* in the problem of the creation of the universe, and it appears to be in the same position in the case of biology. What happened before the point to which science can look back was in each case something suggesting mind and purpose—unscientific ideas, it is true, but none the less real. And philosophy and religion must be founded upon the whole of reality, not merely upon the parts with which science can deal.

Thus it looks as if the long controversy with regard to evolution and Christianity might soon close. The Christian has been perfectly right in demanding a special creation, and the scientist

* A. S. Eddington, *The Expanding Universe*, 1933, p. 68.

has been equally right in denying that such an idea ought to constitute a part of science. Evolution *may* be a perfectly necessary idea for science, but on viewing the world as a whole it must be seen to have the same kind of meaning as in such an expression as "the evolution of the petrol engine." The truth to which the evolution of science points may be an evolution of the ideas in the mind of God, rather than any direct physical connection. But since science cannot deal with God it must rightly ignore such possibilities.

Discussion.

The Chairman, Mr. Douglas Dewar, B.A., F.Z.S., said: Dr. Clark has given us a valuable and suggestive paper—one eminently suited to a philosophical society.

He shows himself greatly in advance of modern scientific opinion in that he boldly says there are indications that a theory of special creation of species may once again hold the field. He describes with admirable clarity what he holds to be the correct attitude of the scientific biologist. I do not agree with him that this is the right attitude. I do not accept his contention that it is not sufficient that a fact be true in order that it may form a part of science. In my view science ought to take cognisance of *every fact*. It is the business of the biologist to survey the living world, or some corner of it, and try to discover how plants and animals are made, how they live, their relations to one another and how they have come into being. The biologist ought to set out on this quest with an open mind, not wedded to any theory, though willing to consider all hypotheses advanced. This survey shows that, despite the great variety of animals and plants, each species can easily be fitted into a scheme of classification based on morphological grounds. The biologist ought to try to discover why this is so and how each of these species originated, whether each from the beginning exhibited its distinctive features, or is descended from a very different kind of ancestor. In other words, one of the chief aims of the biologist should be to discover whether the great variety exhibited by the organic world is the result of separate acts of creation, or of a process of evolution or transformation, or of both.